

FTA ALTERNATIVES ANALYSIS
DRAFT/FINAL ENVIRONMENTAL IMPACT STATEMENT

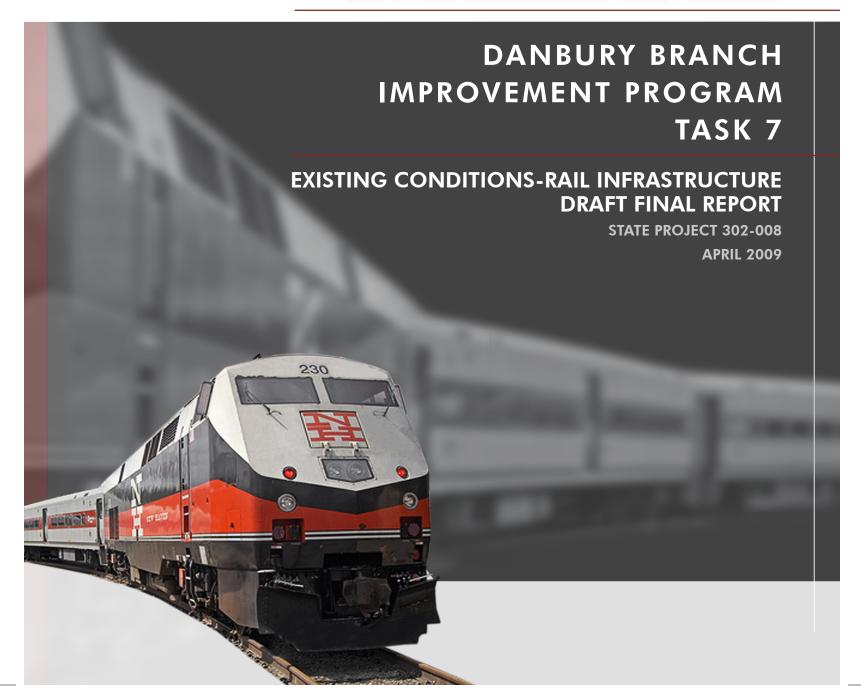


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1. INTRODUCTION

The Connecticut Department of Transportation (ConnDOT) has initiated a feasibility study to examine the needs of and identify potential improvements to the New Haven Line's commuter rail branch line service between Norwalk and Danbury. A Congressional earmark has provided the funding for the study, which has been divided into two phases. Phase I of the study has been completed and included the identification, review, and evaluation of a range of preliminary improvement alternatives to the branch, including electrification, addition of passing sidings, extension of service to New Milford, and track realignment modifications. Phase II of the study has begun and will constitute an environmental impact analysis and documentation for proposed action(s) following the National Environmental Policy Act (NEPA) and Connecticut Environmental Policy Act (CEPA) process.

The Danbury Branch Electrification Study area corridor consists of 24.2 miles of existing rail line between Norwalk and Danbury which is owned by the Connecticut Department of Transportation, and about 14 miles of existing rail line between Danbury and New Milford, which is owned by the Danbury Terminal Railroad. The following three (3) reports represent the Phase II efforts in documenting existing conditions within the study corridor:

- Existing Conditions Environmental
- Existing Conditions Transportation Operations
- Existing Conditions Rail Infrastructure

This report documents the existing conditions of the Rail Infrastructure. It summarizes existing conditions between Norwalk and New Milford as determined from a review of existing documents and from Phase II research and field investigations. Expansion of the study limits north of New Milford to Pittsfield, Massachusetts was recently added to the study scope. Conditions of the rail infrastructure North of New Milford will be added as an addendum.



2. DOCUMENT REVIEWS

The following documents were among those utilized in collecting existing condition information for the Danbury Branches rail infrastructure:

Feasibility Study Danbury Branch Electrification - Phase I (State Project No. 302-008)

Phase I of this study was completed by Washington Group International (now URS Corporation) in March 2006 for the Connecticut Department of Transportation. The study identified, reviewed, and evaluated a range of preliminary improvement alternatives to the branch including electrification, addition of passing sidings, extension of service to New Milford, and track realignment modifications. Work in Phase I also included extensive documentation of existing rail infrastructure conditions. The Phase I findings were documented in the following Final Reports:

Volume 1 Executive Summary

Volume 2 Task 1 – Purpose and Needs

Volume 3 Task 2 – Evaluation of Engineering Alternatives

Task 3 – Ridership Forecasting

Task 4 – Evaluate the Impact of Electrification

Volume 4 Alternatives Summary

Evaluation Report

Appendix A – Public Outreach Plan

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Examination of Existing Steel Catenary Structures

This report was prepared in April 2002 by L-C Associates Inc. for the Connecticut Department of Transportation Office of Rail Operations. The report was prepared as part of the examination of existing out-of-service catenary poles along the Danbury Branch to determine their condition and adequacy for use again to support active electrification of the line. The study found that the old structures do not meet the requirements both in layout and strength to support the planned Traction Power and Communications and Signal Systems.

Danbury Branch Signalization & Pole Line Project (State Project No. 0302-0007)

A 75% design plan submission was made by Gannett Fleming Transit & Rail Systems in January 2008. The submission included construction plans and specifications for signalization of the

electrification.

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Branch Line. The plans show the signal cable installed overhead on new poles alongside the railroad. The poles are designed to also support an existing AT&T fiber optic cable (currently

supported overhead by the on existing poles) and equipment necessary for branch line

Bethel- Norwalk Extended Electromagnetic Compatibility Analysis

This study aimed to determine and mitigate, if necessary, electromagnetic interference that is anticipated to be transferred to the Metro-North railway associated with a new 345 kV transmission line (Phases I and II) being constructed from Norwalk 9S Substation, in Norwalk, to Norwalk Junction Transition Station, located a few miles away in Wilton, Connecticut. A final report documenting study findings was prepared by Safe Engineering Services & Technologies Ltd. (SES) for Northeast Utilities Service Company and is dated July 2008.

Investigations determined that during rare, unfavorable conditions, touch voltages for both the 345 kV and 115 kV line installations may exceed safe threshold values during faults in a narrow zone located between Norwalk Junction and Grist Mill Road. Several variations of mitigation schemes were examined. A recommended mitigation scheme, identified in the report as the Impedance Bond Solution B was designed to satisfy all operational, maintenance requirements and preferences of Metro-North Railroad (MNRR) and the Connecticut Department of Transportation (ConnDOT).

Other Study Sources

Several other sources were reviewed and used to develop this report. The following is a list of these sources consulted:

- Metro-North Track Charts (2008)
- Housatonic Railroad Track Charts
- Housatonic Time Table Number 1
- ConnDOT Bridge Inspection Reports (2008)
- Housatonic Railroad Bridge Inspection Reports (2008)
- Metro-North Utility Easements



3. FIELD INVESTIGATIONS

To supplement the review of documents in determining existing conditions, URS performed a series of field investigations in support of this report. These investigations included the following:

Metro-North Inspection Trains

URS, ConnDOT and MNR personnel attended a MNR train inspection along the Danbury Branch line on March 11, 2008. The inspection train started at Grand Central Station and proceeded east to the Danbury Branch. The train ran along the Danbury Branch from the South Norwalk Station north to the Danbury Station, and then proceeded south to the Norwalk Station. Various issues concerning the branch line were discussed during the trip including the slow track speed at the south end of Norwalk, the new signal system and passing sidings, the addition of a Georgetown Station, the partial electrification option, and the various railcar service options. Meeting minutes which detail the various issues discussed during the trip and track observations are included in Appendix A. Photos taken are in the inspection train summary report that is included in **Appendix C**.

A second MNR inspection train trip on the Branch was attended by team members on July 22, 2008. URS representatives rode train 1819, leaving Danbury at 6:20 AM, into GCT to meet the inspection train. During the inbound trip the consist makeup, trip time, passenger boardings, and station parking were observed. On the inspection train, discussions were held with MNR police, MNR Public Outreach, MNR Service Planning, MNR's new president, and others from MNR and Conn DOT. Notes of the trip are included in Appendix A

Hi-Rail Tour with HRRC from Danbury to New Milford

URS, ConnDOT, and Housatonic Railroad personnel performed a hi-rail tour of the Maybrook and Berskshire Lines from Danbury to New Milford on July 9, 2008. Hi-rail is a street vehicle modified to run on the railroad track. The tour began at White Street (MP. 76.95) on the Maybrook Line and ended north of Route 202, Bridge Street in New Milford (MP 11.01) on the Berkshire Line. The tour was recorded by digital video. Meeting minutes documenting the tour observations are included in **Appendix B** along with the tour DVD.

Danbury Branch Line Field Walkthroughs

URS, FHI, HRRC and MNR personnel performed various field walkthroughs along the Danbury Branch Line. The purpose of the walks was to observe and locate wetland and historic features, conduct visual inspections of bridges, take measurements of sidings, observe and document track conditions, and identify various potential station sites. The field visits took place on July 9, 2008, September 8, 2008 to September 11, 2008, and on October 7, 2008 and October 8, 2008. Field review notes documenting sections walked and driven and the findings are included in **Appendix B** along with relevant photos

DANBURY BRANCH ROUTE

4. DANBURY BRANCH ROUTE

South Norwalk to Danbury

The existing Danbury Branch, depicted in **Figure 1**, is a single-track main line, approximately 24.2 route-miles in length, which connects the cities of Norwalk and Danbury. The railroad and right-of-way is owned by the State of Connecticut. MTA Metro North Railroad (MNR) provides commuter rail service over the Danbury Branch under contract to Connecticut Department of Transportation. The Providence & Worcester Railroad has trackage rights over the line to provide freight service.

The south end of the Danbury Branch starts at Mile Post (MP) 0.0, where the line connects directly with the MNR New Haven Line interlocking designated CP 241. The MNR South Norwalk station is located on the New Haven Line, approximately 0.3 miles railroad-south of CP 241.

The Connecticut Department of Transportation's ownership of the Danbury Branch extends northward from MP 0.0, Norwalk, to MP 24.2, White Street, in Danbury. MNR commuter rail passenger service terminates at the MNR Danbury station, MP 23.3. The Danbury Branch parallels the Housatonic Railroad Company (HRRC) Maybrook Line between MP 23.6 and MP 24.2. A crossover connects the MNR and HRRC. MNR does operate beyond the Danbury Station for storage and maintenance of equipment (to MP 24.2).

This segment of rail was originally constructed in the 1850's as the Danbury & Norwalk Railroad. The overall railroad alignment has not been appreciably upgraded since the original construction and the current alignment reflects the narrow right-of-way and numerous curves typical of earlier railroad construction. The railroad generally follows the Norwalk River, northward from Norwalk, for 15 miles. Between MP 15 and MP 16, approximately midway between Branchville and Redding, the Danbury Branch crosses over the ridgeline separating the Norwalk River and Sympaug Brook. Between Redding and Danbury, the railroad generally follows Sympaug Brook and Still River.

Danbury to New Milford

The Danbury – New Milford railroad segment, shown in **Figure 1**, connects the City of Danbury and the Town of New Milford. The route is a single-track main line, approximately 14.3 routemiles in length. The line is not equipped with an automatic block signal system. The Danbury – New Milford segment consists of two distinct sections:

For this study, it is assumed that Danbury – New Milford trains will cross over from the Danbury Branch to the Maybrook Line at MP 23.9. MP 23.9 on the Danbury Branch equates to MP 77.4 of the Maybrook Line. The Maybrook Line is owned and operated by the Housatonic Railroad Company (HRRC). This length of track consists of a main track and a parallel siding track. HRRC provides freight service to various

<u>Connecticut Department of Transportation</u> <u>Danbury Branch Improvement Program AA/DEIS</u> on-line customers. The Providence & Worcester Railroad also has trackage rights over this section. Commuter rail service is not operated on this line.

The Tilcon Running Track is located adjacent to the Maybrook Line. The running track proceeds from MP 74.8 (prior to assumed Danbury Branch cross over) and ends just South of the Berkshire Line at MP 79.9. The running track provides access to various businesses adjacent to the tracks such as AWD (MP 78.1) and Tilcon (MP 79.2).

• The north – south Berkshire Line diverges from the Maybrook Line at MP 80.0. This location is designated as Berkshire Junction. Starting at MP 0.0 (Berkshire Junction), the Berkshire Line runs northward to New Milford (MP 11.1). This section of the Berkshire Line is owned and operated by HRRC. North of New Milford (MP 11.1), the line continues to Pittsfield, MA. HRRC provides freight service along the line, however the line is owned by ConnDOT from New Milford to the Massachusetts State Line. Commuter rail service is not operated over this line.

Today's Housatonic Railroad was originally constructed in the 1830's. Various line changes were made afterwards to reduce curvature. The line generally parallels the Still River and Housatonic River north of Berkshire Junction. Overall, curvature and grade north of Danbury is less stringent than the line south of Danbury.



5. PASSENGER STATIONS AND SIDINGS

Existing MNR Station Locations

Referring to Figure 1, Location Map, and Figure 2, MNR Track Charts, MNR station stops are currently provided at:

- South Norwalk: MP 41.0 (New Haven Line), Pocket tracks with 2-car platform for Danbury shuttle, and 7-car platform on the New Haven Line.
- Merritt 7 (Merritt Parkway, U.S. 7): MP 3.7, 7-car platform capacity.
- Wilton: MP 7.4, 4-car platform capacity.
- Cannondale: MP 8.9, 2-car platform capacity.
- Branchville: MP12.8, 3-car platform capacity.
- Redding: MP 17.3, 2-car platform capacity.
- Bethel: MP 21.0, 5-car platform capacity.
- Danbury: MP 23.6, 3-car platform capacity.

Merritt 7 is provided with a low level platform. The South Norwalk platforms and all other platforms on the Danbury Branch are high-level platforms. A new station at Georgetown is planned by a private developer. Additional details of these stations are provided in the Existing Conditions – Transportation Operations Report.

Sidings

There are four passing sidings and several sidings located along the Danbury line between South Norwalk and the Danbury Station. The first passing siding is located on the east side of the main line in South Norwalk from MP 0.1 to MP 0.6. There is also a siding located off of this passing siding on its east. The second passing siding is located at the Wilton Station and runs from MP 7.0 to MP 7.4 on the east side of the tracks. A third passing siding is located just north of the Branchville Station. This passing siding is also located on the east side of the mainline and runs from MP 12.7 to MP 13.0. There is a siding located at MP 20.3 that leads to Vanderbilt Chemical on the East side of the tracks. Just North of this siding at MP 20.4 are the Ring's End Lumber siding followed by the Bethel-North siding, both located to the West of the mainline track. Located to the east of the mainline is the Sperry Rail Service at MP 22.2. A diagram of the various sidings from South Norwalk to the Danbury Rail Yard is included in Figure 4.

There are a number of sidings within the Danbury Rail Yard, which are depicted in **Figure 5**. There is a passing siding that runs to the left of the mainline along the Danbury Rail Yard loop from MP 23.0 to MP 23.8. A crossover to this passing siding is located at MP 23.1. There is a link that is located at MP 23.0 and reconnects to the mainline at MP 23.9 which is used to turn around the trains. There is a siding to the Danbury Station on the north side of the mainline at

Connecticut Department of Transportation Danbury Branch Improvement Program AA/DEIS MP 23.2. There are three sidings that are used for storage. The turnout to these sidings is located at MP 23.8. The turnout to the Danbury Railroad Museum is located in the middle of the Danbury loop and can be accessed by a turnout located on the link. The MNR Danbury Line and the HRR – Maybrook Line parallel each other from MP 23.6 to 24.2. The crossover to the HRR – Maybrook Line Tilcon Runner is located at MP 23.9, which equates to the HRR MP 77.4.

The MNR Danbury Line crosses over to the HRR – Maybrook Line's Tilcon Running Track. Along this segment of the rail line, the tracks run in an east-west direction. The running track begins South of the MNR crossover at MP 74.9 and continues to MP 79.9. There is a crossover located at MP 77.6 that connects the Maybrook Line to the running track. The AWD siding is located off of the running track at MP 78.1 on the south side. The siding that provides access to Tilcon is located off of the running track at MP 79.2 on the south side. The Tilcon running track ends at MP 79.9.

The HRR - Berkshire line begins at Maybrook Line MP 80.0 at the Berkshire Junction. At this point, the rail line runs in a north-south direction and the Berkshire line mileposts begin at MP 0.0. The Stearns passing siding begins at MP 0.05 and continues to MP 1.1. This passing siding is located on the east side of the mainline. There is one siding off of the east side of the Stearns passing siding which provides access to PHARMCO. Another siding provides access to the rail line for ACH foods on the west side of the tracks. The siding switch is located at MP 9.60. Located just north of this siding is the Kimberly Clark passing siding on the west side of the mainline track. This passing siding runs from approximately MP 9.7 to approximately MP 10.1. There is a siding located off of the passing siding on its west side which provides access to the Kimberly Clark facilities. The final passing sidings along the HRR-Berkshire line between Danbury and New Milford is at the former New Milford station. This passing siding is located on the west side of the mainline and runs approximately from MP 11.0 to MP 11.5. A second passing siding is located on the west side of this siding just north of the New Milford station from MP 11.2 to MP 11.5.

Reconfiguration of MNR New Haven Line at CP 241

The Danbury Branch connects to the MNR New Haven Line at CP 241 by means of a No. 8 turnout. The MNR employee timetable stipulates that the maximum allowable speed over this turnout for trains operating to and from the Danbury Branch is 10 mph. CP 241 also consists of a series of crossovers that enable trains entering or leaving the Danbury Branch to access to any of the four main tracks on the New Haven Line. There are short stub track leads off the New Haven Line at South Norwalk station; the Danbury – South Norwalk shuttle trains generally platform on these tracks rather than the main line platform. The interlocking diagram for CP 241 is depicted in **Figure 6**.

The northward New Haven Line is located on an embankment between South Norwalk station and the Norwalk River Bridge. In addition, the New Haven Line crosses over several local streets by means of undergrade bridges at this location. The situation is further complicated because the northward New Haven Line curves off to the right on a superelevated curve of 4° 04' curvature while the Danbury Branch leads to the left off the New Haven Line on an a curve of 8° 20'.

PROFILES AND GRADES

6. PROFILE AND GRADES

South Norwalk to Danbury

Referring to Figure 2, MNR Track Charts, the existing Danbury Branch profile (vertical alignment) consists of four major segments:

- The line descends at an estimated average grade of 0.4 % between South Norwalk (MP 0.0) and the Wall Street tunnel (MP 1.5). The longest sustained grade, as well as the maximum grade on this segment is 0.76%, descending between MP 0.2 and MP 0.7.
- The line ascends between Wall Street tunnel (MP 1.5) and Topstone Road grade crossing (MP 15.0) at an estimated average grade of 0.6 %. Maximum grades are 1.33% (MP 1.6 - MP 2.1) and 1.27% (MP 12.8 - MP 13.1, MP 14.1 - MP 14.3). The longest sustained grade is 1.20% between MP 13.1 (Branchville) and MP 14.1.
- The line descends at an estimated average grade of 0.5 % between Topstone Road grade crossing (MP 15.0) and MP 17.5 (Redding). The maximum grade is 1.30% between MP 16.8 and MP 17.1.
- The line generally consists of a rolling profile between MP 17.5 (Redding) and MP 23.3 (Danbury). The estimated average grade on this segment is 0.1% (descending toward Danbury). The longest sustained grade, as well as maximum grade, on this segment is 1.25% (descending) between MP 17.8 and MP 18.4.

The profile and grades of the Danbury Branch are typical of other commuter rail operations in the United States. Due to the short consists operated on the line, currently 3-7 cars, the profile and grades generally do not pose any unusual operating concerns for MNR. However, it is noted that trains may run occasionally run later than scheduled due to certain conditions, such as weather (snow and heavy rain), leaf slippage during the Autumn, and unforeseen track and equipment problems (such as a broken rail or sticking brakes on a coach).

Danbury to New Milford

Referring to **Figure 3**, HRRC Track Charts, the existing railroad profile (vertical alignment) between Danbury and New Milford can be categorized into four major segments:

- The line descends at an estimated average grade of 0.6 % between the MNR Danbury Station (MP 23.3), MP 23.9 / MP 77.4 and the Still River Bridge (MP 79.6), just west of Berkshire Junction. The longest sustained grade, as well as the maximum grade on this segment is 0.80%, descending between MP 77.7 and MP 79.6.
- The line generally consists of a rolling profile between the Still River Bridge (MP 79.6), Berkshire Junction (MP 80.0 / MP 0.0) and MP 2.7. The estimated average grade on this segment is 0.4% ascending. The longest sustained grade, as well as the maximum grade is 0.6% ascending between MP 1.7 and MP 2.7.

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- The line descends at an estimated average grade of 0.4 % between MP 2.7 and the Housatonic River Bridge (MP 10.2). The maximum grade is 0.6% between MP 8.6 and MP 9.1. The longest sustained grade is 0.5% between MP 3.9 and MP 6.4.
- The line ascends at an estimated average grade of 0.3% between the Housatonic River Bridge (MP 10.2) and the New Milford station (MP 11.1). The longest sustained grade on this segment is 0.2% between the Housatonic River Bridge (MP 10.2) and MP 10.8. The estimated maximum grade on this segment is 0.6% between MP 10.8 and the New Milford station (MP 11.1).

The profile and grades of the Danbury – New Milford segment are not anticipated to pose any operating problems for commuter trains.

CURVATURE, SUPERELEVATION, UNDERBALANCE & TRACK SPEED

7. CURVATURE, SUPERELEVATION, UNDERBALANCE, & TRACK SPEED

South Norwalk to Danbury

Ideally, a railroad should be constructed on tangent (straight) track and level grade as much as possible. However, right-of-way availability and construction considerations, particularly in difficult topographic and geologic locations, often results in the use of curves and grades to reduce construction costs. Referring to Figure 2, MNR Track Charts, the Danbury Branch horizontal alignment consists of 62 curves. **Table 1**, Existing Curve Data, provides geometry data for each curve that is shown on the track charts. Geometry often dictates the maximum speed that a train can negotiate over a specific curve. The data depicted in Table 1 was used in developing run times for this study.

An analysis of the curve data noted the following:

- An estimated 9.8 miles of the 23.3-mile route between South Norwalk and Danbury is constructed on curves; or, approximately 42% of the total route.
- The maximum degree of curvature on the line is the 17° Loop Track at Danbury Yard (however, MNR revenue trains do not operate on this curve). The curve with the next greatest degree of curvature is a compound curve of 9°40' and 5°00'in Norwalk, just south of the Wall Street tunnel. The maximum allowable speed over this curve is 25 mph.
- 42 of the 62 curves between South Norwalk and Danbury are 3°00' or greater. In general, the maximum allowable speed on a 3° 00' curve is 50 mph; the maximum allowable speed generally decreases as the degree of curvature increases.

MNR criteria for establishing the maximum allowable speed on curves are detailed in their document, "MW 4, Manual for Construction, Maintenance and Inspection of Track." MNR's preferred maximum superelevation is 4 inches at 1.5 inches underbalance. MNR has indicated that 3 inches of underbalance is acceptable on the Danbury, as specified in the meeting minutes of the MNR Coordination Meeting from February 28, 2008 (Appendix A). Figure 7 presents the existing maximum speed with speed restrictions along the Danbury line.

Danbury to New Milford

Referring to Figure 3, HRRC Track Charts, the Danbury - New Milford horizontal alignment consists of 28 curves. Table 2 provides geometry data for each curve that is shown on the track charts. Degree of curvature often dictates the maximum allowable speed over a stretch of track, however, maximum allowable speed on the Danbury - New Milford segment is actually governed by condition of the track structure.

The Federal Railroad Administration (FRA) Track Safety Standards define the minimum requirements to which railroad track must be maintained for a given range of speeds. The FRA Track Safety Standards set minimum requirements and allowable tolerances for the following: roadbed (drainage and vegetation), track geometry (gage, alignment, surface and superelevation) and track structure (ballast, crossties, rail, rail joints, tie plates, fasteners and turnouts).

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The HRRC generally maintains this segment of track in accordance with the requirements of
FRA Class 2 Track Safety Standards. The maximum allowable operating speed on track that is
maintained to Class 2 standards is 25 mph for freight trains and 30 mph for passenger trains.
Track that is maintained to FRA Class 3 Track Safety Standards will permit speeds of up to 40
mph for freight trains and 60 mph for passenger trains. It should be recognized that the degree of
curvature may govern track speed on curves rather than the FRA maintenance standards. As an
example, a stretch of track could be maintained to FRA Class 3 standards, however, fully
superelevated curves with a degree of curvature of 3° 00' would restrict the maximum speed to
50 mph rather than the 60 mph maximum speed permitted by FRA.

The geometry of most of the existing curves on the Danbury – New Milford segment will support operating speeds greater than 30 mph if the following is carried out: 1) longer spirals are provided; 2) additional superelevation is provided; and 3) the track is upgraded to accommodate the increase in operating speeds. The curve data depicted in **Table 2** was used in developing existing and proposed run times for this study. An analysis of the curve data noted the following:

- An estimated 6.5 miles of the 14.3-mile route between Danbury and New Milford is constructed on curves; or, approximately 45% of the total route.
- The maximum degree of curvature between Danbury and New Milford is the 17° Loop Track on the MNR Danbury Line just north of the existing MNR Danbury station. This curve is restricted to 10 mph.
- The greatest degree of curvature on the Maybrook Line is a compound curve of 5°00' and 4°00' located in Danbury, between Wildman Street and White Street. The current maximum allowable speed over this curve is 25 mph.
- The greatest degree of curvature on the Berkshire Line is a compound curve of 2°00' 4°00' 2°00' at MP 1.2, north of Berkshire Junction. A compound curve of similar curvature is located at MP 10.4, just north of the Housatonic River Bridge. The current maximum allowable speed over both curves is 30 mph.
- Six of the 28 curves between Danbury and New Milford are 3°00' or greater. In general, the maximum allowable speed on a 3°00' curve is 50 mph, assuming proper superelevation and that the track is in compliance with FRA Class 3 track safety standards. The maximum allowable speed generally decreases as the degree of curvature increases.

For this study, we have assumed that MNR criteria for establishing the maximum allowable speed on curves would be used on the Danbury – New Milford segment. MNR requirements are detailed in their document, "MW 4, Manual for Construction, Maintenance and Inspection of Track." MNR's preferred maximum superelevation is 4 inches at 1.5 inches underbalance. Both MNR and HRRC have indicated that 3 inches of unbalance is acceptable, as specified in the meeting minutes from the MNR Coordination meeting on February 28, 2008 (**Appendix A**) and HRRC Hi-Rail Tour on July 9, 2008 (**Appendix A**). **Figure 8** depicts the maximum allowable speed with speed restrictions along the HRRC segment of the rail line.



8. TRACK STRUCTURE

With the exception of between MP 0.0 and 0.2 and between MP 23.0 and 24.2, the rail from South Norwalk to Danbury is 136 lb rail and was installed between 1997 and 1999. From MP 0.0 to 0.2, rail is 131 lb and was installed in 1975. Between MP 23.0 and 23.6, 132 lb rail was installed in 1996, and between MP 23.6 and 24.2, 107 lb rail of unknown age exists. In almost all cases, ties were replaced, rail grinding performed, and ballast cleaned within two years of rail installation. The exception is between mile markers 0.0 to 0.2, where ties were replaced in 1993 and ballast and grinding took place in the late 1990's. In General along the Danbury Branch, track structure; rail, ties, and ballast is in good condition. Track charts for the existing Danbury Branch Line include the detailed track structure information and appear in **Figure 4**.

A project is currently underway to replace ties along the South Norwalk to Danbury segment. Work started in Fall 2008 and completion of the work is planned for later in 2009.

From Danbury to New Milford the Rail is older and lighter. Along the Maybrook Line the rail is dates back to the 1920's. The Berkshire Line rail was also installed in the 1920's. The track along these segments is in fair to poor condition with old rail, worn ties and fouled ballast. On the Berkshire there are speed restrictions due to deteriorated track conditions.

HORIZONTAL & VERTICAL CLEARANCES

9. HORIZONTAL AND VERTICAL CLEARANCES

The State of Connecticut has certain legal clearance requirements that railroads must maintain. Minimum requirements, based on level, tangent track, include:

- Track Centers: 13' 0" between main tracks, 15' 0" between main track and adjacent subsidiary track.
- Vertical clearances: 22' 6" between top of rail and bottom of structure (such as a highway bridge or tunnel ceiling). Exceptions may be granted to permit a reduction in vertical clearances.
- Horizontal clearances: 8' -6" from centerline of track to face of obstruction (such as thru bridges and retaining walls), 5' - 7" at high-level station platforms (from top of rail to top of platform).

These dimensions would have to be increased on curves to account for superelevation, and midbody overhang and end overhang of the rail cars. It may also be desirable to widen track centers above the preferred minimum on curves where degree of curvature becomes a consideration.

The AREMA standard for the clearance envelope criteria for MNR is included in Figure 9 and the envelope criteria for HRRC is included in **Figure 10**.

Several tight horizontal and vertical clearances currently exist on the Danbury Branch, including various rock cuts, overhead highway bridges and the Wall Street Tunnel in Norwalk. One concern raised by the Office of Rail is the horizontal clearance located in Ridgefield where Simpaug Turnpike closely parallels the railroad line, as pictured below. At this location the roadway and ballast abut each other.



Simpaug Turnpike in Ridgefield (MNR MP 15.6)

Existing Clearances at Overhead Bridges

Included in the roadway bridge summaries (**Table 3**) are the minimum vertical and lateral clearances present under the bridges. These measurements are taken relative to either the railroad track centerline or edge of road for a roadway if both a roadway and highway are under the roadway bridge.

The minimum vertical clearance required for railroad tracks is 22'-6", with exceptions granted to permit the of vertical clearance requirements. Currently there are three bridges along the Danbury Branch line that meet the minimum requirement standards. These roadway bridges include I-95 (MP 0.54) and both Route 7 bridges (MP 4.30 & 11.79). Twelve of the bridges do not meet the minimum requirements. It is unclear whether three of the total 18 overhead bridges currently meet the vertical requirements since the minimum vertical clearance on these bridges was taken relative to a roadway below the bridge and not the railroad tracks.

The minimum lateral clearance required for railroad tracks is 8'-6" from the centerline of the tracks to the face of the obstruction. The lateral clearances listed in Table 1 are measured from the centerline of track to the nearest substructure unit including a pier or abutment, a rigid barrier, or to the toe of a slope steeper than 1 to 3. Currently there are twelve bridges that meet the minimum horizontal requirements. Four of the bridges do not meet the minimum requirements. These roadway bridges are all located along the HRR – Berkshire Line and include Silvermine Road (MP 3.25), Route 25 (MP 4.3), Old Pumpkin Hill Road (MP 6.93) and Erickson Road (MP 7.76). It is unclear whether two of the bridges currently meet the lateral clearance requirements since the minimum lateral clearance on these bridges was taken relative to a roadway below the bridge and not the railroad tracks.

OVERHEAD AND UNDERGRADE BRIDGES

10. OVERHEAD AND UNDERGRADE BRIDGES

Included in **Tables 3 & 4** are listings of the overhead and undergrade bridges located between South Norwalk and New Milford along the Metro-North Rail Line (MNR) and the Housatonic Railroad Company Line (HRR). There are eighteen roadway bridges that are over the Danbury Branch line that are maintained and inventoried by the Connecticut Department of Transportation – Bridge Structure Unit. There are 28 railroad bridges along the MNR portion of the Danbury Branch (between South Norwalk and Danbury) that are maintained and inventoried by the Connecticut Department of Transportation - Railroad Unit. There are nine railroad bridges along the HRR segment (between Danbury and New Milford) that are maintained by HRR.

The overhead roadway bridges were inspected between January 2006 and January 2008. The bridge inventory rates the bridge elements on a scale of 0 (failed condition) to 9 (excellent The various elements of the bridge that are rated include the bridge deck, superstructure, substructure, and the overall bridge condition. Additionally, the inventory list includes the minimum lateral clearance and minimum vertical clearance. These roadway bridges are summarized in Table 3.

The railroad bridges that are located within the MNR segment of the rail line include the same inventory ratings as the overhead bridges. However, this inventory listing only rates the overall bridge condition. These bridges were inspected between March 2004 and March 2008. The railroad bridges are summarized in Table 4. Most of these undergrade bridges are of deck girder, open deck construction.

The railroad bridges located along the HRR segment of the Danbury Branch were inspected between June 2005 and June 2007. These bridges are inventoried based on the condition of individual elements that pertain to the masonry condition, the conditions of the girders, beams or trusses, condition of the steel bracing, floor system and trestles. The inventory rates these elements as being in good condition, not hazardous condition, or as needing repair. inventories also note bridges that need immediate attention, which are included in the bridge listings in the comments column within summary Table 4. For this study, most undergrade bridges are assumed to be of deck girder, open deck construction. The longest and most notable structure on the Danbury - New Milford segment is the through truss bridge over the Housatonic River (HRR-Berkshire Line MP 10.18).

Overall, the bridges along the Danbury Branch line are in fair condition. There are three roadway bridges that are listed as having elements in poor condition or worse. The Wall Street Bridge (MP 1.47) deck is rated as being in poor condition, while the Burnell Boulevard (MP 1.53) bridge deck is rated as in serious condition and its superstructure is rated as being in poor condition. The Simpaug Turnpike bridge (MP 16.21) substructure is rated as being in critical condition. Five railroad bridges along the MNR segment of the Danbury Branch are rated as being in poor condition and one is rated as in serious condition. The bridges in poor condition include a bridge over a stream (MP 6.43), a bridge over the Norwalk River (MP 8.70), a bridge over Old Mill Road (MP 11.01), and two bridges over the Sympaug Brook (MP 19.79 & 21.41). The railroad bridge over a brook (MP 9.91) is in serious condition. Railroad bridges along the

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Connecticut Department of Transportation Danbury Branch Improvement Program AA/DEIS HRR segment of the railroad line include seven bridges that are in need of immediate attention which mainly include cleaning of the bearings. The bridge over Center Road (MP 2.44) notes deterioration at girders as well, and the bridge over the Housatonic River (MP 10.18) is in need of pointing of the abutments and pier and needs replacement of a lateral angle brace. The bridge over Butler Brook (MP 10.78) needs the arch pointed, cleaned and repaired immediately.



11. RAILROAD HIGHWAY GRADE CROSSINGS

The Danbury Branch from South Norwalk to Danbury is crossed at grade by 25 public highways and eight private crossings. All public crossings are provided with flashing light warning devises; 18 of these crossings are also provided with crossing gates. One of the private crossings is provided with flashing lights, the remaining private crossings are provided with signs. The railroad – highway grade crossings are listed in **Table 5**.

The Danbury – New Milford segment is crossed at grade by six public highways and two private crossings. The HRRC track charts indicate that two local grade crossings in New Milford, South Ave. and Mill St., are provided with flashing light warning devises; the other four public grade crossings on the Danbury – New Milford segment are provided with flashing lights and gates. Private crossings are provided with signs. The railroad – highway grade crossings are listed in **Table 6**.

RAILROAD SIGNAL SYSTEM

12. RAILROAD SIGNAL SYSTEM

South Norwalk to Danbury

Existing Manual Block Operating Rules. The existing Danbury Branch is not equipped with a signal or train control system and is operated in conformance with Metro-North Railroad (MNR) "Manual Block" operating Rules. Block Stations are located throughout the Danbury Line and are used to define the specific limits of track or "Blocks" that a train can safely occupy under the Rules. Since the Danbury Line is predominantly single-track, it is equipped with several passing sidings to facilitate multiple train movements and train "meets" wherein one train can meet and safely pass another. In addition to passenger train movements, there are freight railroad movements operated by the Providence & Worcester Railroad in conformance with MNR operating rules. All train movements are supervised by the MNR Train Dispatcher in GCT, NY.

Block limit stations are located at BERK (MP 0.3, South Norwalk), DOCK (MP 0.8, South Norwalk), GLOVE (MP 3.6, Merritt 7), WILT (MP 7.3, Wilton), HILL (MP 12.7, Branchville), DAN (MP 23.1, Danbury) and CANAL (MP 23.7, Danbury). The minimum scheduled running time, including station stops, between following or opposing trains is usually determined by the longest block. The longest block on the Danbury Branch is between HILL and DAN, only one train can operate in this block at a time, running time in this block, including station stops is 25 minutes. Block limit stations are also used to facilitate track inspection, maintenance and repair.

Passing sidings are located at South Norwalk (MP 0.1 to MP 0.6), Wilton (MP 7.0 to MP 7.4), Branchville (MP 12.7 to MP 13.0) and Danbury (MP 23.0 to MP 23.8). The turnouts leading to these sidings are manually operated by the train crews.

Currently, there are two scheduled meets per day. Train Nos. 1881 and 1844 meet at WILT block station at 5:44 p.m., weekdays. Train Nos. 1895 and 1882 meet at WILT block station at 9:32 p.m., weekdays. Both meets utilize the Wilton passing siding.

The Federal Railroad Administration requires that an automatic block signal system be in service on lines where passenger trains operate at speeds of 60 mph or greater. The South Norwalk – Danbury track geometry improvements proposed in this report would enable maximum allowable speeds of 60 mph or greater.

Highway-Rail Grade Crossings. There are 25 public highway-rail grade crossings and eight additional private grade crossings along the Danbury Branch. All of the public and private grade crossings are equipped with required warning signs. All of the public grade crossings are equipped with standard railroad flashing warning light signals, and 18 of the public crossings are also equipped with railroad crossing gates. One private crossing is equipped with flashing lights.

Danbury to New Milford

The MNR Danbury Branch between the MNR Danbury station and the connection to the Maybrook Line is operated under manual block rules. An MNR block station (DAN) and a passing siding at the MNR Danbury station facilitates unscheduled meets and the staging of trains. The turnouts leading to the passing siding are hand-operated by the train crews. The

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<u>Connecticut Department of Transportation</u> <u>Danbury Branch Improvement Program AA/DEIS</u> crossovers connecting the MNR Danbury Branch to the HRRC Maybrook Line are also hand-operated.

The Maybrook Line between Danbury and Berkshire Junction is located within yard limits and operates under yard rules. This segment consists of two parallel tracks, the two tracks converge to a single track just west of Berkshire Junction. A left-hand crossover designated as WILD is located just east of Wildman Street. All turnouts are hand-operated by the train crews.

The Berkshire Line is operated under manual block rules between Berkshire Junction and MP 8.5. Block limits are located at BERKSHIRE JUNCTION (MP 0.0), STEARNS (MP 1.0) and BROOKFIELD (MP 4.4). The Berkshire Line between MP 8.5 and New Milford is located within yard limits and operated under yard rules. Passing sidings are located at Stearns, Kimberly Clark (just south of the Housatonic River Bridge) and New Milford station. These sidings are generally used to facilitate switching of industries rather than accommodate meets. All turnouts are hand-operated by the train crews.

TRACTION POWER;
SUBSTATIONS AND CATENARY

13. TRACTION POWER; SUBSTATIONS AND CATENARY

The New Haven mainline is electrified by an overhead trolley/contact wire and feeder system. It operates at 12.5 kV AC. Power distribution is by substations at about 5 mile spacing along the mainline. The Danbury Branch joins the mainline in South Norwalk at CP 241 about a quarter mile east of the South Norwalk Rail Station. CP 241 is a interlocking on the mainline that encompasses the area from the station east to the moveable bridge that crosses the Norwalk River. The interlocking is approximately one half mile in length and includes 6 crossovers, 3 turnouts and 7 derails with related signals. The Branch was previously electrified.

The Danbury Branch rail was initially electrified in 1925 as a result of similar efforts to reduce travel time between Danbury and Norwalk. Electrified train operation resulted in trip time reductions as compared to earlier steam locomotive powered trains. The introduction within the railroad industry of diesel locomotives in the 1920's, followed by continuing improvements in diesel performance, resulted in the transition of Danbury Branch service from electric to diesel power in 1961, 36 years after the line was electrified. The overhead electrification system was later removed, except for a short section from MP 0.0 to MP 1.4.

Substations

The substation in South Norwalk, SUB 524, is located adjacent to catenary structure no. 524 on the New Haven main line. The substation consists of a control house situated on the north side of the track with oil circuit breakers mounted on the truss of structure no. 524. SUB 524 has an oil circuit breaker (DY) which feeds the small section of remaining catenary that extends up the Danbury Branch and portions of the yard located by Science Road. SUB 524 is scheduled for replacement with a new metal-clad switchgear substation located by catenary structure no. 513. The new substation will contain a circuit breaker for the catenary as well as a circuit breaker for a future Danbury feeder circuit.

Catenary

The catenary on the Danbury Branch consists of the original system installed in the 1920's. The only remaining portion of this catenary extends from the junction with the mainline by catenary structure no. 526 up to catenary 17D on the Branch line. This catenary as it comes off the mainline, is the older inclined catenary design as it follows a sharp 9° curve before entering into the tangent portion by the yard tracks by Science Road. These catenary wires would be replaced with a tangent chord system more compatible with the new Auto-Tensioned catenary system now being installed on the New Haven mainline.

Existing Catenary Support Structures

The Danbury Branch was electrified from Norwalk to Danbury from 1925 until the mid 1950s. While the catenary contact wire and support arms were removed, most of the vertical support structures remain in place. During the public scoping meetings, reuse of these support poles was suggested. Evaluation of the existing structures was performed and it was determined that they cannot support the extra loads required for electrification and existing spacing between poles is

April 2009 Draft Final, Task 7 <u>Connecticut Department of Transportation</u> <u>Danbury Branch Improvement Program AA/DEIS</u> inadequate. As a result, the conditions of existing catenary structures do not allow their use for future electrification of the branch line.

The steel structures were erected along the Danbury Branch Line in 1924 from Norwalk to Danbury. Most of the electrification including down guys have been removed and currently only an AT&T fiber optic cable is in place, installed in the year 2000. The majority of the structures consist of single steel H-pile poles, which are bolted to two channels that are embedded in a concrete foundation. There also are steel trellis types, which are primarily found in the existing electrified section in Norwalk. The average spacing of the existing structures is approximately 250 feet on tangents and 200 feet on curves.

In 2002, a report was prepared by L-C Associates, Inc. for the Connecticut Department of Transportation Office of Rail Operations. The report, Examination of Existing Steel Catenary Structures, was prepared as part of the examination of the existing catenary poles to determine their condition and the adequacy of the structures to support future loads. Future loadings include; Communication & Signal (C&S) cables, existing fiber optic cable, and future electrification.

Condition evaluations were conducted for all existing steel catenary structures along the Branch. The report provides analyses, repair/replacement recommendations and cost estimates for the repairs based on these evaluations.

The report determined that overall the steel structures are in fair to poor condition. Some of the more common deficiencies for the H-pile posts being: bent main members, section losses to channels at the steel/concrete interface, connection bolts and nuts with severe losses and post bases that are buried under dirt and debris. In addition, existing structures on curves require guy wires and guy anchorages. The report states that guy anchorages are still in place from the original erection but their present condition is not known and nor whether they could withstand the required tensions. The analysis performed also showed that all 6 inch, 8 inch and 10 inch pile posts with a span length greater than or equal to 250 feet were not adequate to support the load of future electrification and the existing AT&T fiber optic cable even without taking into account section losses.

An important design criterion for a catenary or overhead electrification system is the spacing (longitudinally along the track) of supports. As part of the Feasibility Study for Danbury Branch Electrification, Phase I, Task 4, Evaluate the Impact of Electrification, it was determined that the necessary standard pole spacing along tangent track is 200 feet. For curved track pole spacing is dependant upon the degree of curve. As the degree of curve increases, the curves become sharper and closer pole spacing is required to maintain the trolley wire/pantograph interaction, as follows:

- For Tangent track, span = 200'
- For Curves less than 1° 30', span = 143'
- For Curves 1°- 30' to 2°- 30', span = 103'

- For Curves 2° 30' to 3° 30', span = 86'
- For Curves greater than 3° 30', span = 75'

As noted previously, the old support poles are spaced approximately 250 feet apart on tangents and approximately 200 feet on curves, both of which exceed the new system requirements. In addition to the deteriorated condition of the existing poles, their layout is not appropriate for the proposed overhead catenary system.

In view of the identified deficiencies and requirements of a replacement electrification system, ConnDOT included new support poles in the latest Danbury Branch Signalization & Pole Line Project design (75% plans dated Jan. 2, 2008).

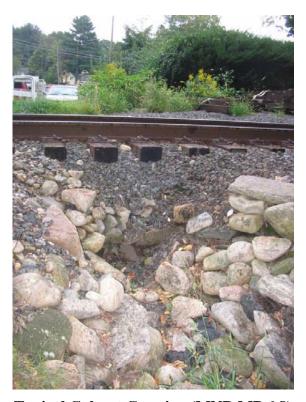
URS has performed a cursory review of the Danbury Branch Signalization& Pole Line Project and noted that the above span length criteria were satisfied. The intent of that project was to install poles or vertical supports that would carry the C&S cables required for signalization and the existing AT&T fiber optic cable and be sufficient to add cantilever arms and wires for a future electrification project. Completion of such a project was assumed in the Final Report for the Feasibility Study Danbury Branch Electrification (Phase I).

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14. DRAINAGE

Typical drainage conditions along the Danbury Branch line consists of runoff from the railroad tracks naturally draining into watercourses and wetlands that are adjacent to the railroad tracks. These watercourses include the Norwalk River, Still River and Housatonic River. There are a number of culverts that cross under railroad tracks that allow drainage to cross from one side of the tracks to another to adjacent streams or wetlands. A typical culvert crossing is pictured below and carries drainage from one wetland area to another wetland area on the other side of the tracks.



Typical Culvert Crossing (MNR MP 6.8)

There are several drainage issues within the railroad track right-of-way. Most of the drainage problems consist of washouts, standing water, and debris from flooding along the tracks. There are also many drainage issues near overhead crossings where run off from roads drain to the tracks which results in standing water along the sides of the tracks. Observed drainage issues are detailed in the Field Report for the Walkthrough of the MNR Danbury Branch Line and Housatonic Rail line, Meeting Minutes for the Hi-Rail Tour with HRRC, and the Metro-North Train Inspection. All of these reports are included in **Appendices A and B**. The following is a summary of the drainage issues along the Danbury Branch line.

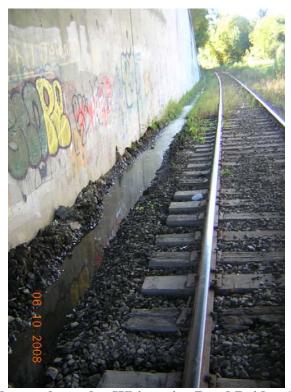
There were several drainage issues noted between the South Norwalk Station and the old New Milford Station. One of the most notable drainage problems noted was at the Wall Street Tunnel (MP 1.5) pictured below. Water is leaking from the east abutment wall resulting in standing water all along the east side of the tracks for the majority of the length of the tunnel.

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Water Leakage at East Abutment at Wall Street Tunnel (MNR MP 1.50)

Photographed below is the drainage issue underneath the Whisconier Road Bridge along the HRR – Berkshire Line segment of the railroad line. Runoff from the bridge overpass drains into this area. Standing water is present along the tracks for the length of the bridge and beyond.



Standing water by tracks under Whisconier Road Bridge (HRR – Berkshire Line)

Standing water is adjacent to the tracks is a common drainage issue along the tracks. Pictured below is standing water along the west side that meanders across the tracks. A similar drainage Connecticut Department of Transportation Danbury Branch Improvement Program AA/DEIS

issue was noted along the HRR – Berkshire Line segment of the rail at MP 3.1, where standing water was also observed along and across the railroad tracks.



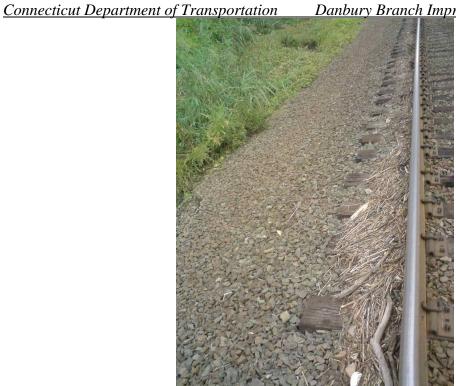
Standing Water along West Side of Tracks (MNR MP 4.70)

In some locations, poor drainage has caused ballast washout within the tracks and erosion at the base of the cross ties. Photographed below is a washout observed at MP 9.4 along the MNR segment of the rail line.



Poor Drainage (MNR MP 9.40)

There is a segment of the tracks just north of the Bethel Station that is surrounded by wetlands on both sides and floods during heavy rain storms. Photographed below is debris along the outside of the tracks at this location, indicating that flooding was high enough to reach the top of rail.



Debris along Tracks due to Flooding (MNR MP 21.3)

The photograph below was taken along the HRR – Berkshire Line segment of the Danbury line. As shown, sediment from runoff has built up along the tracks to the top of rail.



Sediment Build-up at Tracks (HRR - Berkshire Line MP 1.5)



15. UTILITIES

There are several utilities that parallel or cross the Danbury Branch Rail Line. Observed utilities are detailed in the Field Report for the Walkthrough of the MNR Danbury Branch Line and Housatonic Rail line and within the meeting minutes of the Hi Rail Tour with HRR which are included in the Appendices. The following is a summary of the utilities along the Danbury Branch line.

From the South Norwalk Station to the Danbury Station, the major utilities include buried fiber optic cable, overhead 115 kV electricity lines and overhead fiber optic cable that is on the existing catenary poles. Overhead 345 kV electricity lines are currently under construction in Norwalk and Wilton. Buried fiber optic cable runs parallel to the tracks within the railroad ROW for most of the Danbury Branch line to the Danbury Station. There are some locations where the buried fiber optic cable crosses underneath the tracks. These locations are clearly marked with orange flagging. The overhead fiber optic cable is on the existing catenary poles for most of the Danbury line to the Danbury Station. The fiber optic cable crosses the rail line in several locations, typically at a horizontal curve or where there is an obstruction on one side of the track such as wetlands, rock outcrops or right-or-way restrictions. Additionally, there are several overhead and underground utilities that cross the track right-of-way at the at-grade, overhead and undergrade roadway crossings. A notable utility crossing is two overhead water mains that cross at Wolfpit Road (MP 6.25).

There are electrical lines that run adjacent to the track within the towns of Norwalk and Wilton, which include the 345kV lines being constructed and the existing 115kV lines (photo below). The overhead electricity lines run parallel to the branch line on its west from Route 7 (Grist Mill Road MP 4.30) to Kent Road (MP 4.93). From Kent Road to approximately 1.10 miles north of Kent Road there are overhead utility lines adjacent on both sides of the track. At this point, the 345kV power lines under construction cross the tracks and end at a substation on the east side of the tracks. Power lines run adjacent to the tracks on the east side until the Route 7 (Honey Hill Road MP 9.90) overhead bridge, at which point the power lines run in an eastward direction away from the tracks. Other utilities that are within the railroad right-of-way between the South Norwalk and Danbury stations are listed in **Table 7**.



Utility lines in proximity of tracks (MP 5.30)

Connecticut Department of Transportation Danbury Branch Improvement Program AA/DEIS The major utilities observed along the HRR portion of the railroad are presented in the meeting minutes of the Hi Rail Tour in the appendices. Unlike the MNR segment of the line, there are no overhead or underground fiber optic cable lines present. The major utilities include a gas line and CL&P transmission lines. The underground gas line runs parallel to the tracks on its west side from approximately MP 2.5 to 3.25. This gas line crosses the tracks in the vicinity of MP 4.8 and 7.6. The CL&P transmission lines cross over the railroad tracks a number of times along the Berkshire Line portion of HRR.

345 KV EMI Study and Mitigation Plan

A July 2008 report entitled the "Bethel – Norwalk Extended Electromagnetic Compatibility Analysis: Part 3" was reviewed as Northeast Utilities (NU) recently completed construction on a new 345 kV transmission line from Norwalk to Wilton. Since the new 345 kV line parallels the Danbury Branch for approximately 3.7 miles, NU initiated the study to ascertain what effects, if any, the new 345 kV line would have on existing MNR operations.

The study considered effects of electromagnetic interference (EMI) on MNR systems (signals, communications, traction power, etc) during various NU power network operating conditions. Past industry experience with similar high-voltage power line construction has shown that close proximity to an active railroad can result in railroad system failures. In certain cases, transferred Alternating Current (AC) voltages and currents from the power line interfere with railroad systems, thereby threatening their integrity. With the right circumstances, close proximity to high voltage power lines can represent a shock hazard to the railroad, especially during worst case load and short circuit conditions of the power line.

The focus of the 345 kV EMI study was to determine the actual interference levels that could be transferred to the railroad track and sub-systems by the new 345 kV transmission line in worstcase conditions and, if conditions warrant, to determine the most appropriate corrective mitigation measures to minimize the risk.

Several mitigation schemes were considered as part of the EMI study, however only one option, identified as "Impedance Bond Solution B" appeared to satisfy all of the railroad operations and maintenance concerns voiced by MNR and CDOT.

These mitigation measures are to be implemented as shown in CL&P drawing titled "Metro-North Railroad EMI Mitigation, Construction Drawings, near the Bethel-Norwalk Transmission Line".

State of Connecticut Annualized Rent Report

The State of Connecticut's Annualized Rent Report for rental rights within State of Connecticut owned rail right-of-way appears in **Appendix D**. A total of 53 rentals are listed in Danbury Branch Line and Berkshire Line towns from Norwalk to New Milford. Listings in Norwalk also involve the New Haven Line. The list includes 31 rentals in Norwalk (town code 102), 3 rentals in Wilton (town code 161), 1 rental in Ridgefield (town code 117), 2 rentals in Redding (town code 116), 4 rentals in Bethel (town code 9), 11 rentals in Danbury (town code 34), no rentals in Brookfield (town code 18), and 1 rental in New Milford (town code 95).

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